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XIII. *An Account of an Experiment contrived by G. J. s'Gravesande, Prof. Math. at Leyden, F. R. S. relating to the Force of moving Bodies, shewn to the Royal Society, by J. T. Desaguliers, LL. D. and F. R. S.*

HAVING last Year shewn several Persons in *Holland* the Experiment contrived by Mr. *Geo. Graham*, to explain the Doctrine relating to the *Momentum* of Bodies (*viz.* That the *Momentum* or Quantity of Motion in Bodies is always as the Mass multiplied into the Velocity) which Experiment is made with a flat, pendulous Body, that receives the Addition of a Weight equal to itself at the lower Part of its Vibration, and by the Reception of that equal Quantity of Matter always loses half its Velocity. Dr. *Muschenbroek*, Professor of Mathematicks and Astronomy at *Utrecht*, communicated to me the following Experiment, made in Opposition to that which I shewed,\* by Mr. Professor *s'Gravesande*. In this last a Spring equally bent every time, pushes forward, unequal Quantities of Matter successively, and in every Experiment the Product of the Mass of the Body by the Square of the Velocity is the same; and therefore, as the Quantity of Motion must always be the same from the same Cause (*viz.* the same Tension of the Spring) it follows, by every Experiment, that it is as the Mass multiplied into the Square of the Velocity.

*Exp. 1.]* The pendulous Cylinder is shot by the Spring from 0 Deg. to 7 Deg. measured upon a Tangent Line.

*Exp. 2.]* The Cylinder with a leaden Weight in it that makes its Weight double, is shot forward to 4 Deg. and 9 Tenths.

*Exp. 3.]* The Cylinder with a Weight in it that made its Weight triple, was shot forward to 4 Degrees and a little farther.

*Exp. 4.]* The Cylinder with a triple Weight of Lead so as to quadruple the whole Weight, was shot forward to 3 Deg. and an half.

These 4 Experiments at first seem agreeable to the new Hypothesis; for according to the old, the Cylinder in the 2d Experiment ought to have gone but to  $3\frac{1}{2}$  Deg. in the 3d Experiment but to  $3\frac{1}{7}$  Deg. and in the last but to 2 Deg.

But if we take in the Consideration of Time, all will be reduc'd to the old Principle. As for Example, let us compare the first and last Experiments.

In the first, the Spring during a certain time acts upon the Cylinder which is driven forward with the Velocity 8. When the quadrupled Weight is driven forward with the Velocity 4 instead of 2, it is because the same Spring acts twice as long upon the Cylinder before it ceases to impel it; and certainly the same Cause acting twice as long must produce a double Effect.

F I N I S.